

**ABSTRACT OF THE DISCLOSURE**

The invention encompasses methods of forming titanium-based mixed-metal materials and zirconium-based mixed-metal materials utilizing one or more of a reduction process, electrolysis process and iodide process. The invention also

5 encompasses a sputtering target comprising zirconium and one or more elements selected from the group consisting of Al, B, Ba, Be, Ca, Ce, Co, Cs, Dy, Er, Fe, Gd, Hf, Ho, La, Mg, Mn, Mo, Nb, Nd, Ni, Pr, Sc, Sm, Sr, Ta, Ti, V, W, Y, and Yb. The invention also encompasses a sputtering target comprising titanium and boron.